



## LD-5 CW/SSB QRP Transceiver



# LD5 – CW/SSB QRP Transceiver

## Quick guide manual

### Description:

At the development base of the digital signal processing unit, an algorithm is embedded for IQ processing of the channels with phase suppression of the unwanted side-band channel!

### Unit CPU \ DSP performs the following functions:

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- Digital signal processing
- Frequency synthesizer
- Full control of the transceiver with direct conversion / SDR /

### Applicaton:

Due to its small dimensions and light weight, transceiver is suitable for any portable or stationary operation.

This unit contains:

- -CPU STM32F407,
- -NS -24 bit ADC PCM1803,
- -NS -16 bit DAC CS4338 low hissing amp
- -HF-generator Si570
- -1602-line LCD
- -Matrix of buttons
- -Encoder

The unit has electronic CW Iambic key, SWR meter and output power wattmeter.

Functions that this unit performs, are separate and switchable for reception / transmission.

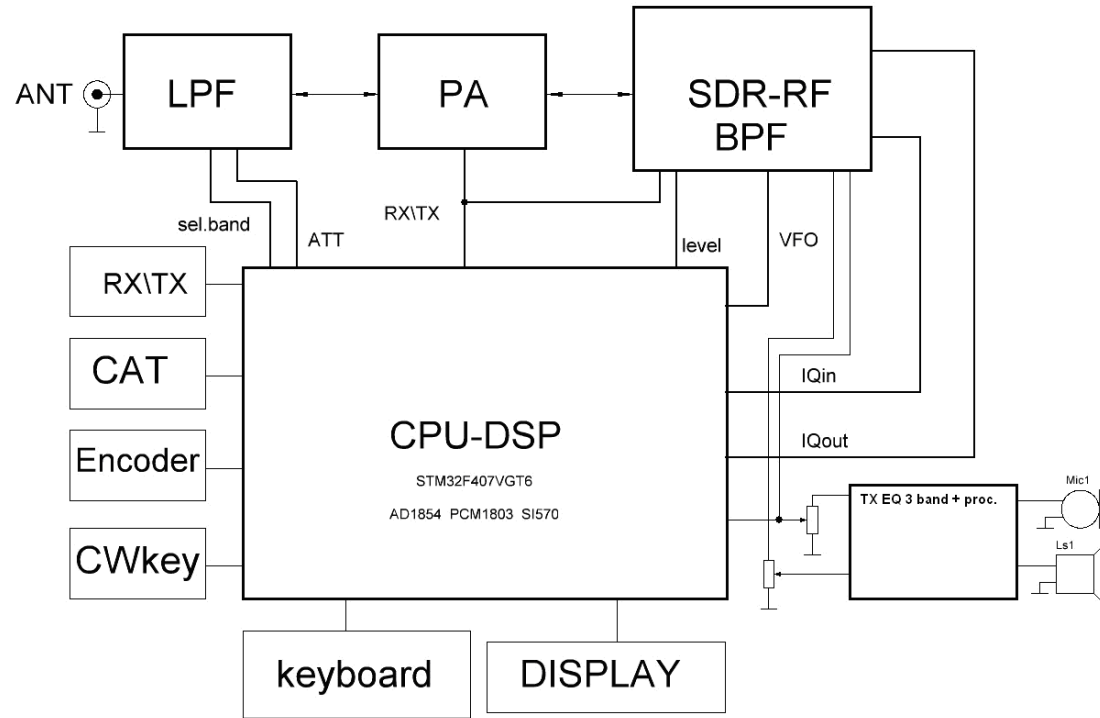
They are displayed on the screen display as RX / TX with symbols.

### How to order:

L&R direct [www.LNRprecision.com](http://www.LNRprecision.com)

### Features

- Emmission Modes: SSB, CW
- 5W output power typ.
- Very low noise floor due to DDC input stage
- The unit has an electronic CW Iambic A/B keyer, SWR meter and output power wattmeter.
- High stability Si 570 generator
- Split-frequency operation
- PTT can be switched by connecting PTT to ground
- RX/TX switching:
  - push PTT input to ground
  - AF VOX
- Output SWR indicator
- Optimal output power indicator
- Integrated Sequencer
- TX 3 band EQ – presets for bass, middle and treble boost



**Block diagram**

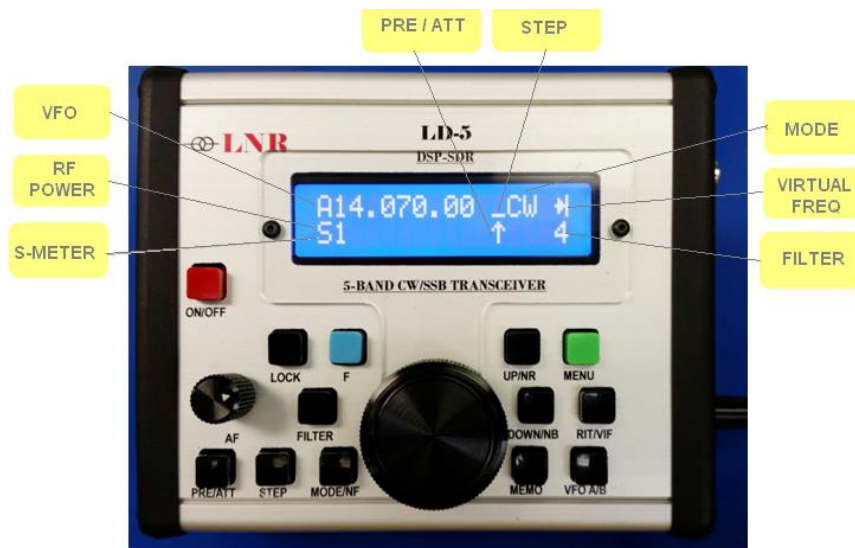
Specifications			
<b>General</b>			
<b>Frequency range</b>	7000 kHz – 22 MHz	40, 30, 20, 17 and 15 meter operation	
<b>Modes</b>	USB , LSB , CW , CW-R	DATA :CAT –USB jack : CW, PSK, RTTY, SSTV – 3,5mm jack	
<b>Power</b>	5 output in CW / SSB		
<b>Frequency Stability</b>	+/- 30 PPM typical over 0-50 deg C		
<b>Supply Voltage</b>	10.5V min to 15V max	350mA receive and 1.5 to 2 A typical in transmit	
<b>Push button operation</b>			

<b>LO temp. Stability</b>		+/- 2.5		
<b>Antenna</b>	50 ohms	BNC		
<b>Dual VFO</b>				
<b>Memory</b>	100 memory storage per band	memorize frequency, mode, VFO's		
<b>Built-in speaker</b>	0.2 watts			
<b>Dimensions</b>	4.724" long X 3.937" wide x 1.957 " tall			
<b>Weight</b>	19.0oz / 0,54kilogram /excluding microphone/			
<b>Iambic key</b>	mode A and mode B			
<b>Pitch CW</b>	adjustable- CW tone from 400 to 1000 Hz when crossing the transmit shift to the same tone			
<b>Notch Filter</b>	reject interfering tone only for SSB from -6 to -40 db			
<b>Noise reduction</b>	level of attenuation of the noise from 1 to 50- use minimal necessary			
<b>Noise Blanker</b>	adjusted in the range from value 4 to 12 readings depending on interference			
<b>CW VOX</b>	retention /delay/ mode in CW – 100 milliseconds to 5000 milliseconds / 5 seconds /			
<b>SSB VOX</b>	max. 0.4 sec.			
<b>Filters</b>	8 different filters – 4 of 4 for CW/ SSB - 1-3 factory presets – No.4 adjustable for CW/50-1000Hz/ and SSB/250-3.6KHz			
<b>Compressor SSB</b>	0-20dB			
<b>SSB – MONITOR</b>	mode in transmit			
<b>Transmitter</b>				
<b>Input Power</b>	8-9			W
<b>Output Power</b>	5	4.0	6	W
<b>Measurement</b>	SWR and Power in numbers or bar			
	supply voltage –real voltage on display			
<b>Two modes CW</b>	a simple key and AUTO as automatic Morse key			
<b>Receiver</b>				
<b>Receive sensitivity</b>	0.2uV	Preamp		
<b>Ant Preamp</b>	+16	dB		
<b>Spurious response rejection</b>	IMD3 -38Db/ 5W	IMD5 -43dB		dB
<b>ATT</b>	-6 db			

## Front panel indicators and functions



## DESCRIPTION of the command buttons



Command	Meaning	Note
<b>ON/OFF</b>	POWER – ON OFF the transceiver	
<b>UP</b>	Switching the ranges or values up	
<b>DOWN</b>	Switching the ranges or values down	
<b>MODE</b>	Switching type of detection	
<b>VFO</b>	VFO A/B switch	
<b>STEP</b>	Switch step between 10Hz 100Hz 1kHz 10kHz (this button is duplicated by pressing the encoder) – a push -10 Hz; two indents- 100 Hz; three pushes -1 KHz ; four pushes 10 kHz	
<b>LOCK</b>	Lock/unlock the encoder” symbol key in place of the step”.	
<b>RIT</b>	On / off :”star” after frequency =0 RIT; Shifting the frequency DOWN – symbol “<”; Shifting the frequency UP – symbol “>”	
<b>PRE/ATT</b>	Switching in three positions: RF preamp “arrow-up”; attenuator and direct reception “arrow down	
<b>FILTER</b>	Switches 8 different filters – 4 of 4 for CW/ SSB, as from 1 to 3 are set by the service menu under default values and 4 separate filters with direct access to adjustments during reception.	
<b>MEMO</b>	100 Memories for all bands with memorizing frequency, type of mode and the filter bandwidth. Memorizing : Press the MEMO button to select the memory number with TUNING, paste it from 0 to 99, then press the DOWN button again and MEMO button again – frequency is stored, MODE, preamp or attenuator, Notch Filter, Noise Blanker, Noise reduction.	
	Memory Recall: Press to select MEMO and with TUNING choose the memory you require from 0 to 99 as the display will show the preset frequency on the bottom line, then press the UP button and it will display the selected frequency and then push memory button again –MEMO – and then you go to: preset frequency, MODE, preamp or attenuator, Notch Filter, Noise Blanker, Noise reduction	

## MENU –settings

Enter in MENU MODE while pressing MENU button and exit the menu mode by pressing the MENU again after set up!

MENU	Default menu settings	Note
<b>AGC</b>	Speed adjustable AGC value 1 to 20, with 1 being with a biggest delay and at 20 with fastest one. Direct adjustment in real time	
<b>PITCH CW</b>	tuning range on CW from 400HZ to 1000HZ implemented automatically on both modes- transmitting to a receiving band, no direct adjustment in real time – and then exit this mode	
<b>CW SPEED</b>	5 to 60 WPM. No direct input tuning in real time, only when exit this mode	
<b>WEIGHT CW KEY</b>	point identical to ratio modes with 2> 1; 2.5> 1; 3> 1; 3.5> 1; 4> 1; 4.5> 1 – to switch abruptly? Turning the tuning right and to the left increases the ratio or decreases.	
<b>CW VOX</b>	adjustment of VOX for CW – DISABLE is off, retention of 100 milliseconds to 5000 milliseconds through 100 milliseconds	
<b>REVERSE CW KEY</b>	Reverse of dots and dashes to paddle	
<b>CW KEY TYPE</b>	two modes SIMPLE as a simple key and AUTO as automatic Morse key with a sharp turn of the tuning	
<b>IAMBIC MODE</b>	Two modes: mode A and mode B.	
<b>NOTCH FILTER</b>	Regulation 6 db to 40 db. Direct tuning in real time.	
<b>NOISE BLANKER</b>	Adjustable from 4 to 12. Direct tuning in real time.	
<b>NOISE REDUCTION</b>	Adjustable from 1 to 50 with 1 being the most big noise suppression and decreased with increasing. Direct tuning in real time.	
<b>S-METER MODE</b>	evidence of S-meter – Two modes Scale and micro volts switching with a sharp turn of the tuning	
<b>TX METER</b>	Display mode of transmission in numbers or bar switch with a sharp turn of the tuning	
<b>SHOW TX</b>	display in transmission power or SWR switch with a sharp turn of the tuning	
<b>POWER TX</b>	Adjustment of the output stage of power at rates from 10 to 100%.	
<b>LED MODE</b>	FOREVER or AUTO mode: in AUTO after certain seconds turns off the backlight on the display and by pressing a button or turning the tuning knob lights turned on.	
<b>SSB TX MUTE</b>	to listen to the microphone signal "monitor feedback," two-mode – on and off	
<b>SSB COMPRESSOR</b>	compressor SSB model from 0 to 100	
<b>SSB VOX</b>	adjustment of VOX for SSB – DISABLE is off, retention of 100 milliseconds to 5000 milliseconds through 100 milliseconds	
<b>VOX LEVEL</b>	adjustment level of microphone for VOX SSB	





## FUNCION SETTINGS = PUSHING F + :

<b>RIT</b>	On virtual intermediate frequency (VIF) – can be set from the main menu from 5000 to 10000 hertz. Identified as arrows on the upper right corner of the display ->. VIF is working as a main working feature and must be switched on permanently. DIRECT CONVERSION should be used as an option.
<b>MENU</b>	Shows the power supply in place of S-meter / SWR / Power – reception and transmission. It remains in this state until pressed again " <b>F</b> <MENU> "
<b>UP</b>	On Noise Blanker. Direct tuning in real time.
<b>MODE</b>	On Notch Filter (only SSB) pass-CW off and does not affect the display- no indication. Direct setting in real time.
<b>DOWN</b>	On Noise reduction. Direct tuning in real time.
<b>FILTER</b>	Modifying bandwidth of filter 4 – separately for SSB and CW. Direct tuning in real time. Push F button, then FILTER and tune chosen bandwidth with TUNING – for exit push FILTER. Direct setting in real time.

## SERVICE MODE

<b>Entry into service mode</b>	To enter into default settings – switch OFF the radio and THEN power it up while F button is pressed!!!! RADIO IS READY NOW!!!! Upon entering the service mode reset all the settings IN DEFAULT <b>EXCEPT "RX IQ", "TX IQ" and fine tuning of the synthesizer.</b> <b>You should not switch factory settings "RX IQ", "TX IQ" THEY ARE set with additional devices, TRANSMITTING certain frequency.</b>
	On each radio in the service menu are recorded INDIVIDUAL factory settings "RX IQ", "TX IQ"!

## BASIC SETTINGS

F button and then press the MENU button and moving with UP / DOWN and RIT	
<b>IF DSP</b>	virtual gap frequency from 5006 to 10013 Hz / recommended to use a low-frequency virtual
<b>V PWR</b>	adjustment of the displayed voltage
<b>REF VFO</b>	correcting the VFO frequency
<b>MULT VFO</b>	Divider VFO. For LD-5 = 4 / do not touch it , it is correct by the service menu/
<b>STARTING FREQUENCY</b>	starting frequency range – can be changed
<b>END FREQUENCY</b>	end of the range, can be varied
<b>S METER</b>	setting S-METER for the range – calibration
<b>RX IQ</b>	Setting the mirror channel correcting the phase and amplitude of IQ for each band separately on RX "- minimum reading – has two modes- fast and slow for quick setting and fine – switched with STEP. <b>transceiver is factory default recorded on the accompanying document</b> <span style="float: right;"><b>Each</b></span>
<b>FILTER SSB</b>	Setup filters from 1 to 3 for each type of work. Changing the filter with the push button "Filter"
<b>FILTER CW</b>	Setup filters from 1 to 3 for each type of work. Changing the filter with the push button "Filter"
<b>AGC DSP</b>	on / off AGC <b>-SHOULD ALWAYS BE ENABLE</b>
<b>SHOW S METER</b>	switches S meter
<b>FILTER TX SSB</b>	Adjustment of bandwidth in the transmit mode /FROM 150 Hz to 3600Hz/ -. Changing adjustment of the upper frequency
<b>FILTER TX CW</b>	With the push button "RIT/VIF" adjustment of bandwidth in the transmit mode /FROM 50 Hz to 1000Hz/ - soft CW manipulation 50 – 180 Hz. BELL SOUND
<b>LEVEL TX</b>	Adjustment of Power – entries are shown from " <b>Power TX</b> "- First row on Display: TX ADC indications power "when all bands are equal in power".

## DESCRIPTION of the settings in transmit mode

PWR / VTT	
<b>POWER TX</b>	First row on Display: TX ADC indications power for each band separately. Second row on Display : Power Control for each band separately, shows power of radio on TX – use forward wave of SWR meter settings are made on a 50 ohms dummy load and SWR = 1, setting indication varies around 100 – 4000
<b>TX IQ</b>	Correcting amplitude and phase balance in IQ channel – in the transmit mode for each band separately For this purpose we need to have a separate receiver on the frequency and listen to the unwanted side band channel – set On minimal hearing. Factory setting on all bands is : A 0.0000 F 0,0000
<b>TX EQ</b>	3 band audio presets on transmit only: bass, middle. Treble boost

## DESCRIPTION of the current settings

/ Those settings are directly accessible by pressing MENU /	
<b>AGC SPEED</b>	ADJUSTABLE in levels of delay from 1 to 20
<b>PITCH CW</b>	CW tones from 400 to 1000 Hz when crossing the transmit shift to the same tone
<b>NOTCH FILTER</b>	reject interfering tone only for SSB from -6 to -40 db
<b>NOISE BLANKER</b>	adjusted in the range from value 4 to 12 - readings depending on interference
<b>NOISE REDUCTION</b>	level of attenuation of the noise from 1 to 50- use minimal necessary
<b>S-METER MODE</b>	shows scale bars or S-units in microvolt's
<b>LED</b>	backlight brightness of the LCD from 0 to 250
<b>CW SPEED</b>	regulating the speed of the automatic key from 20 signs to maximum
<b>WEIGHT CW KEY</b>	dot-dash ratio 2.5> 1 to 4.5> 1 in 0.5
<b>CW VOX</b>	DELAY mode in CW - 100 milliseconds to 5000 milliseconds / 5 seconds /
<b>COMPRESS TX</b>	compression microphone from 0 to 100%
<b>REVERSE CW KEY</b>	reversing dot-dash to paddle
<b>TX METER</b>	shows SWR or power in the transmit mode with bar graph or scale figures
<b>SHOW TX</b>	SWR or power to be displayed in the transmit mode
<b>POWER TX</b>	regulation in mw from 10% to 100%
<b>LED MODE</b>	mode for backlight LCD - constant or relight by pressing any button or rotating of tuning knob
<b>SSB MUTE</b>	on / off microphone - MONITOR mode in transmit

**The radio has a built-in ALC SWR protection, when SWR do not exceed 1:3 – there is no change in output power, But at a greater SWR, the protection gradually lowers the power output, and at SWR = 10 – the output power is only 1%.**

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